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论文

杨树人工林连作土壤中酚酸积累规律及对土壤微生物的影响

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摘要:

对大田不同连作类型黑杨人工林根际土壤取样,利用高效液相色谱法分析土壤中酚酸物质的含量及其变化规律。结果表明:第一代、第二代连作I 69杨和I 69更替连作三代林林地土壤中均含有对羟基苯甲酸、苯甲酸、香草醛、阿魏酸、肉桂酸5种酚酸类物质;第二代和更替三代林土壤中酚酸总含量分别是第一代林的137 87%和64 18%,差异显著;5种酚酸物质中阿魏酸含量逐代降低,苯甲酸和肉桂酸含量则逐代增加,对羟基苯甲酸和香草醛的含量则表现为更替三代林低于二代连作林。外源引入酚酸物质后,5种酚酸对真菌、放线菌、氨化细菌、好气性纤维素分解菌均有影响。微生物数量随不同酚酸处理浓度增加呈现先增加随后下降的变化趋势,但对羟基苯甲酸各浓度处理对真菌、放线菌和氨化细菌均表现为抑制作用,唯独对纤维素分解菌为刺激作用;香草醛各浓度对放线菌均表现为抑制作用,阿魏酸和肉桂酸对纤维素分解菌均为抑制作用。

关键词: 高效液相色谱 杨树人工林 连作 酚酸 土壤微生物

Accumulation of phenolic acids in soil of a continuous cropping Poplar plantation and their effects on soil microbes

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Abstract:

Soil samples in the rhizosphere of different kinds of continuous cropping black poplar plantation were obtained, and the contents of 5 phenolic acids and their variations were analyzed by HPLC. Results show that P-hydroxybenzoic acid, benzoic acid, vanillin, ferulic acid and cinnamic acid are presented in different accumulation characteristics in the soil of all the continuous cropping types. The content of gross phenolic acids of the second and the third generation of poplar plantation significantly increased 138% and 64 2% respectively, compared with the first generation. The content of ferulic acid increased with a planting generation increase, which was contrary to benzoic acid and cinnamic acid. The experiment of adding five kinds of exogenous phenolic acids to the soil was conducted to study their effects on soil microbes, which shows different effects on soil microbes. In general, with an increasing concentration of the treated exogenous phenolic acids, the amounts of soil microbes first increased, and then decreased. However, P-hydroxybenzoic acid has an inhibitory effect on fungi, actinomycete and ammonifier, but has a stimulating effect on cellulosic bacteria. Vanillin has an inhibitory effect on actinomycetes, and the same effect for ferulic acid and cinnamic acid on cellulosic bacteria.

Keywords: high performance liquid chromatography (HPLC) Populus plantation continuous cropping phenolic acid soil microbes

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